JACOBUS HENRICUS VAN'T HOFF

VAN'T HOFF was born in Rotterdam in 1852, the son of a physician. He died in 1911. After completing his work in the University of Leiden, he studied under Kekulé in Bonn and Würtz in Paris and obtained the doctor's degree at Utrecht in 1874.

When only twenty-two years old van't Hoff showed that certain unexplained cases of isomerism would be accounted for if structure formulas were so written as to represent the arrangement of atoms in space and not merely relations in a plane. The importance of this new point of view lay in the fact that it enabled chemists to classify substances which rotate the plane of polarized light and to predict what substances will possess this property. The branch of chemistry known as stereochemistry is the outgrowth of the paper published by van't Hoff in 1874 and of the independent statement of the same idea by LeBel a few months later.

In 1878 van't Hoff was appointed professor of chemistry, mineralogy and geology at the new University of Amsterdam. From this time forward his work has been in physical chemistry rather than in organic chemistry. In the next six years he rediscovered the law of mass action; he worked out the generalized theory of reaction velocities; he showed that the quantitative relation between chemical affinity and heat effect has the same form as the relation between electrical energy and heat effect deduced by Helmholtz. In addition to this he established the theorem which bears his name, on the quantitative displacement of equilibrium with change of temperature.

In 1885 a new period begins. Some experiments by the botanist, Pfeffer, were the starting-point. Pfeffer had been studying the rise of sap in trees and had found that a high pressure is necessary to prevent the diffusion of water through a membrane of colloidal copper ferrocyanide into a solution of sugar in water. Van't Hoff showed that the results of Pfeffer could be predicted if it were assumed that a dissolved substance exercises an osmotic pressure equal to the pressure which it would exert if converted completely into a gas occupying the volume of the solution and having the same temperature. This assumption not only explained Pfeffer's results, but also those of Racult on the vapor-pressures, boiling-points and freezing-points of solutions. When the osmotic pressure theory of

solutions was supplemented by Arrhenius's theory of electrolytic dissociation, it needed only the energy and enthusiasm of Ostwald to raise physical chemistry in the short space of twenty years to the position which it now holds.

In 1894 van't Hoff was offered the chair of physics at Berlin, made vacant by the death of Kundt. This was declined; but the ideal position offered by the Prussian Academy in the following year was accepted and van't Hoff left Amsterdam in 1896 for Berlin. Since that time he has worked systematically at a problem which had interested him off and on for many years previously. The special form of the problem was a systematic study of the conditions of equilibrium in their bearing on the salt deposits at Stassfurt, but the general results are applicable to all cases in which the deposits consist chiefly of any mixtures of the chlorides and sulphates of sodium, potassium, magnesium and calcium. Although not yet finished, the work is a masterpiece and shows what can be expected from an application of physical chemistry to geology and mineralogy.

The work of van't Hoff can be divided crudely into four parts: 1872–1877, organic chemistry; 1878–1884, chemical affinity; 1885–1895, theory of solutions; 1896–1904, oceanic deposits. Much of the organic chemistry of to-day is the direct outcome of the work done in the first period; the second and third periods made physical chemistry possible; the fourth period has probably introduced a new era in geology. It was because van't Hoff is a great exponent both of organic chemistry and of physical chemistry that he was the first man to be awarded the Nobel prize in chemistry.

VAN'T HOFF IN AMERICA

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ON the occasion of its tenth anniversary, the University of Chicago invited some distinguished foreign scholars to attend its celebration. Among these was Van't Hoff. Whilst on his journey Van't Hoff kept a brief diary which has since found its way into Ernest Cohen's life of the great Dutch chemist (in German).

No sooner were the necessary arrangements completed with Nef, representing the University of Chicago, than further invitations began to pour in from the American Chemical Society, from Yale, from Richards at Harvard, from Bancroft at Cornell, from Loeb at Wood's Hole, etc.